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STATE OF NEW YORK

FOREST, FISH AND GAME COMMISSION

ANNUAL REPORT

OF THE

Superintendent of State Forests



ALBANY

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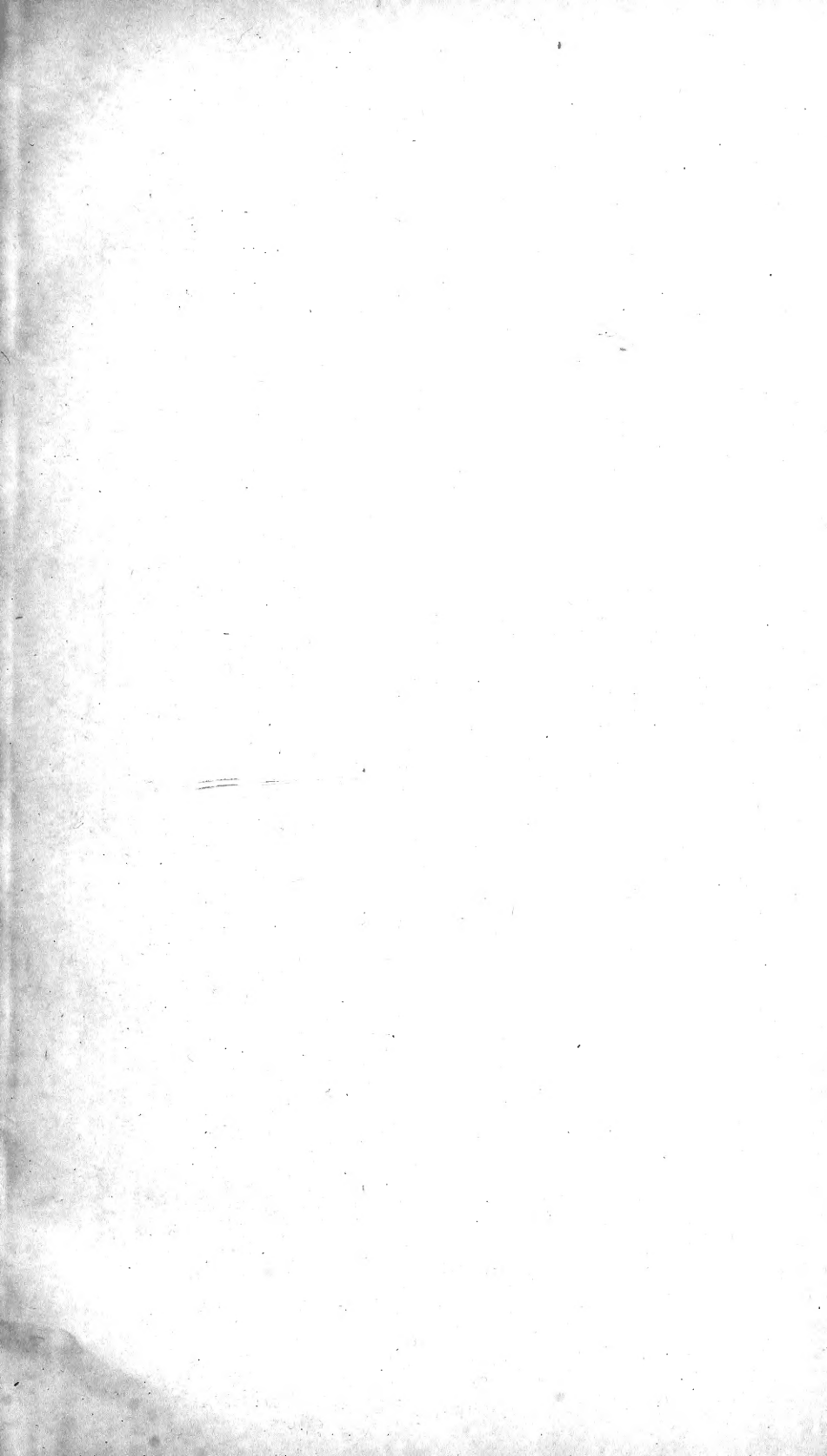




Photo. A. Knechtel.

View in State forest, Adirondack Park. Mixed species.

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Report of the Superintendent of Forests.

ALBANY, N. Y., January 2, 1907.

HON. J. S. WHIPPLE, *Forest, Fish and Game Commissioner*:

SIR.—The forest law of this State requires, in section 232, that the Superintendent of Forests “shall report annually to the Commission, showing the annual timber product of the Adirondack and Catskill forests and, also, the extent of the forest fires and losses therefrom”; and “shall make such other reports from time to time as may be required by the Commission, or may be necessary for its information.”

Pursuant to this requirement I respectfully submit in the following pages a report of the work done by the Forest Department of your Commission during the year 1906. The duties devolving on this Department are varied and numerous, including, among the more important ones, the prevention of forest fires, the suppression of trespasses and timber cutting on the State Preserves, the surveying of woodland tracts to settle questions of disputed boundaries, the litigation of land titles where the ownership of the State is questioned, the prosecution of all trespasses, whether intentionally committed or otherwise, the reforestation of the waste or denuded lands of the public domain, the maintenance of nurseries for the propagation of forest tree seedlings, the preparation of publications giving information on the subject of forestry, the examination and appraisal of forest lands offered for sale to the State, and all other business incidental to the care and custody of the vast landed estate constituting the Forest Preserve of New York.

REFORESTING.

In my previous reports I have each year described briefly the work done in connection with our efforts to reforest the denuded lands in the Forest Preserve. This work has attracted the favorable notice of many citizens throughout the State who have written to the De-

partment asking for further information as to the methods employed in our tree planting and nursery work, and some of them have already undertaken work of this kind. As a reply to these numerous requests for instruction I have made here a more detailed report of our reforestation operations, and have described at some length the methods employed in our nurseries for the propagation of forest tree seedlings. This report, when printed, will be mailed to persons seeking information as to these matters, and will save the time hitherto used in answering their letters.

The planting of seedling trees for the purpose of reforestation waste lands in the Forest Preserve was commenced by this Department in 1901, when some small areas of mountain land in the Catskills were set out with white and Scotch pine. Since then plantations have been made each year in the Adirondacks, over 500,000 seedlings trees having been planted in 1902, and about 450,000 in 1904.

These plantations were made at various places, the largest ones as follows: in Franklin county, on the burned lands situated on the south side of the highway running from Lake Clear Junction to West Harrietstown, and beginning at a point about one mile east of the former; another, on the line of the railroad from Lake Clear Junction to Saranac Lake village, beginning at the three-mile post and occupying the denuded lands on either side of the line for a distance of about one mile in length and a half-mile in width; another, in the same county, on the highway from Paul Smith's to Meacham Lake, occupying the barren plains both sides of the main road north of Mountain Pond and covering the open fields along the branch roads leading on the one side to Osgood River, and, on the other, to Slush Pond; and in Essex county, along both sides of the highway from Saranac Lake village to Lake Placid, at a place known as Club Hill, about five miles beyond Ray Brook; and another on the abandoned fields situated on the south side of Ray Brook, opposite the new State hospital for consumptives.

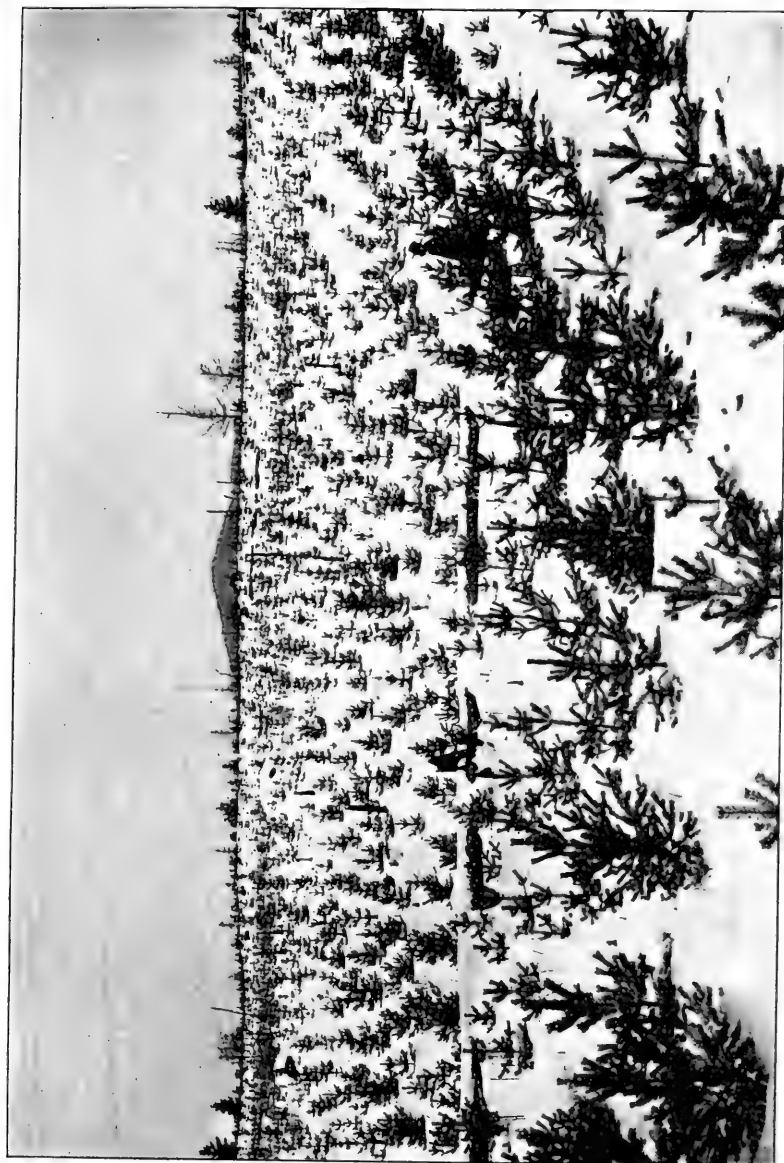
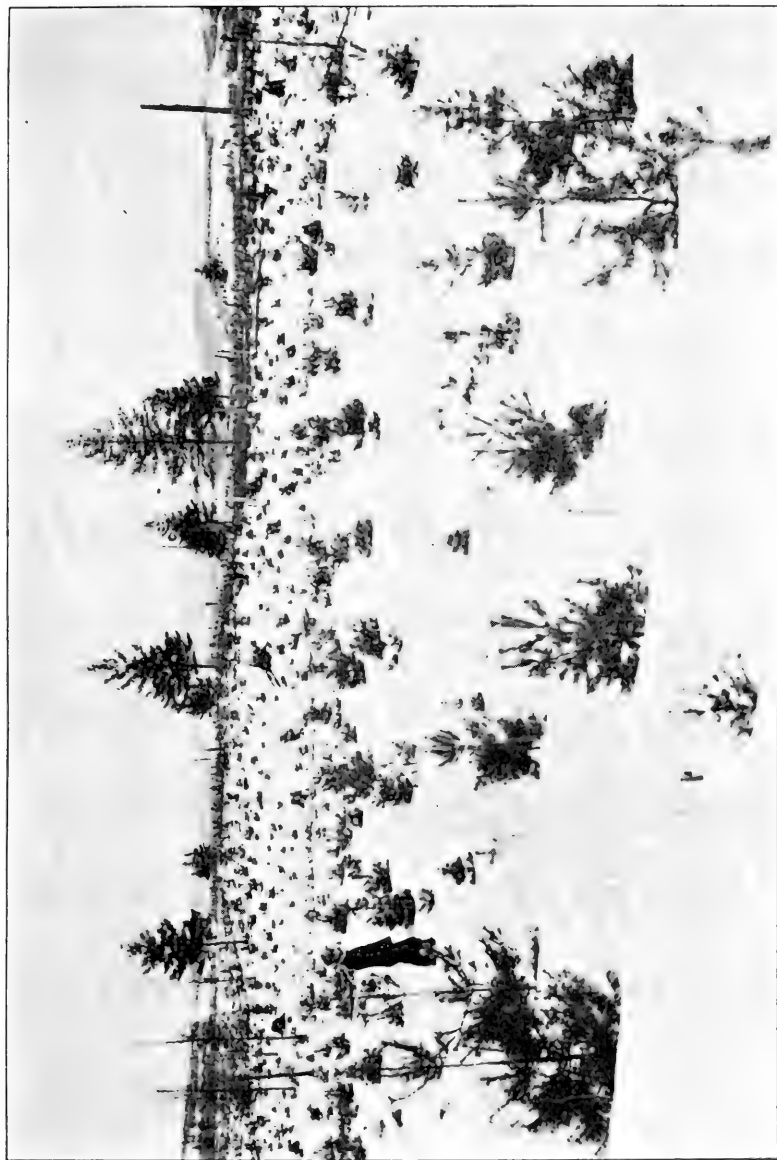


Photo. A. Knechtel.
Plantation of 650 acres made in 1902; photographed in 1906. Set out originally with 4-year-old transplants 10 to 14 inches high; trees now 6 feet high and making leaders each year 18 to 26 inches long. Trees planted at 5-foot intervals and all alive. The area included in this photograph is planted with Scotch pine.





Reforesting burned lands with white pine. West Harrietstown plantation, Franklin County, N. Y.
Photo. A. Knechtel.

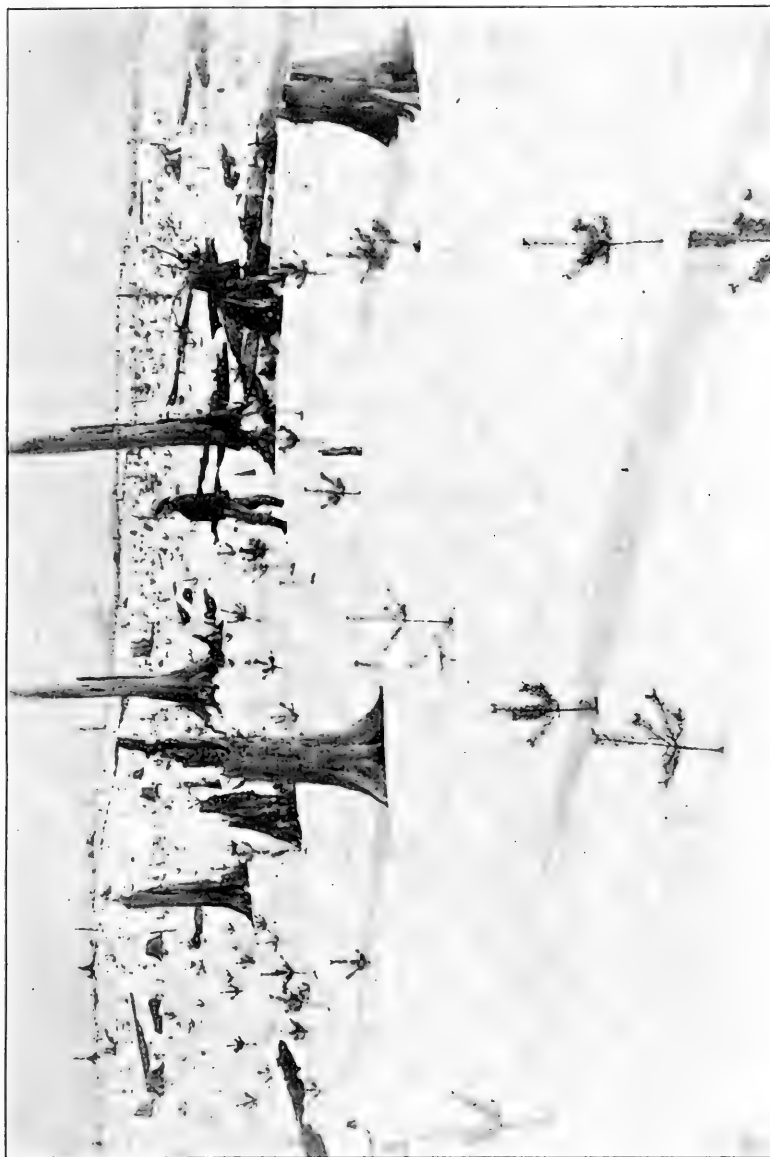


Photo. A. Knechtel.
Burned, sandy lands planted with Scotch pine. Land utterly worthless for any other purpose.

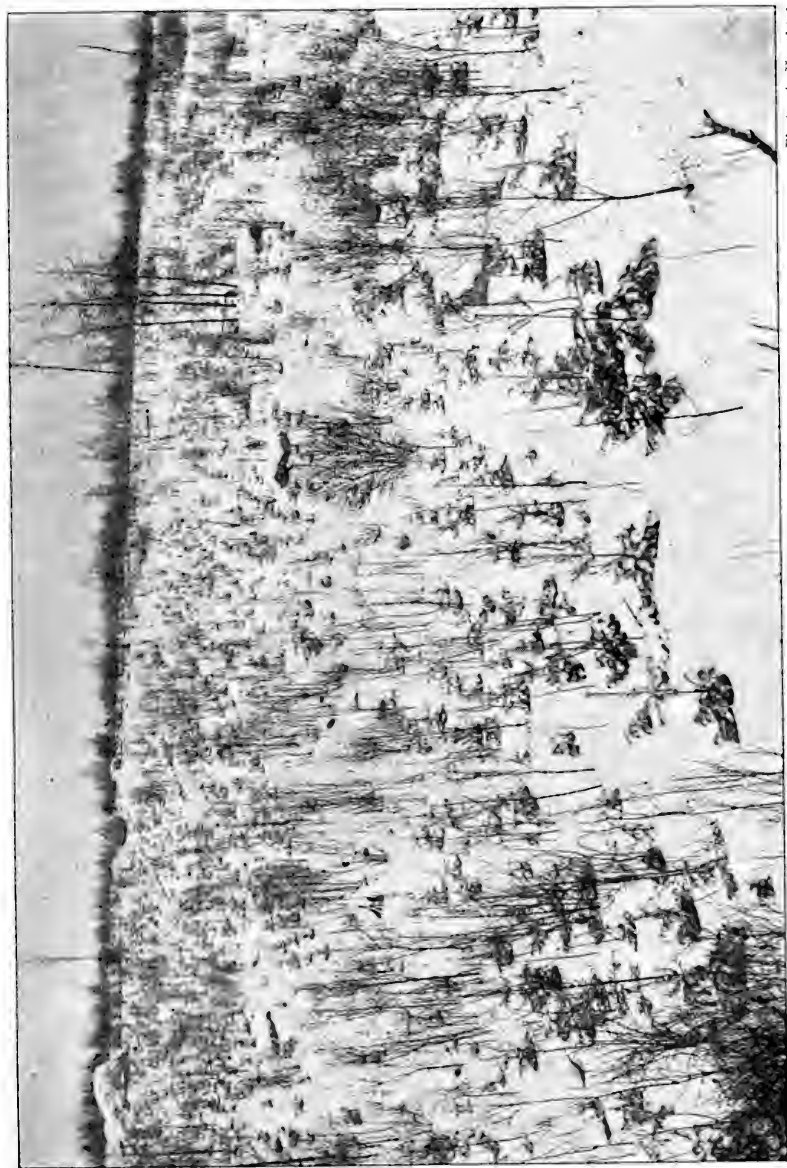


Photo. A. Knechtel.

Waste land occupied with young poplars and bird cherry, underplanted with white pine.

The plantation on the West Harrietstown road, made in 1902, is in a very satisfactory condition. Coniferous species only were used on this tract,—pine, spruce and larch. The Scotch pine and white pine planted there have now attained an average height of five feet, while many of them are taller than an ordinary man.

The plants used were mostly three and four-year old transplants, the balance of the stock consisting of two-year old seedlings, untransplanted. The latter were tried because of our inability to obtain larger plants. The transplants varied in height from eight to fourteen inches. For the first two years these infant trees made but little growth, as their vitality was sufficient only to recover from the shock of transplanting and in establishing the new root growth necessary to further development. But in 1905 and 1906 the pines put on each year "leaders" or tips from fourteen to twenty-three inches long; and if the present rate of growth continues these trees will attain ten years hence a height of twenty feet or more, the crowns will meet, and the young forest will be in evidence. The accompanying photograph taken this year shows the condition of this plantation at the present time, all of the trees being alive and in a thrifty condition.

The soil in which this planting was done is so poor that the undertaking seemed at one time a hazardous experiment. The land had been burned over repeatedly, destroying every vestige of humus and leaving only a clear sand that would not adhere when pressed in the hand. The ground was covered with a low, scanty growth of ferns and huckleberry bushes, while here and there young poplars were making their appearance. It was certainly an unpromising site for any future tree growth of merchantable species. But as our Northern pines are found largely on a sandy soil these species were used for a large part of the plantation, and the result has justified their selection. The percentage of plants that died was unusually small, much less than in operations of this kind as observed elsewhere. The blanks were filled the next spring, and

now that portion of the plantation occupied by white and Scotch pine shows unbroken rows of young trees without a dead one anywhere in sight.

A few of the white pines on this tract (West Harrietstown) were taken up in 1904 and others set out in their place. These plants were not dead, but their main stems were covered in spots with a white powdery substance showing that they had been attacked by a genus of bark lice, the *chermes pinicorticis*. As a result these plants showed a dwarfed, distorted growth, and although they may have lived they would not attain a desirable height or shape. There was danger, also, that the other trees of this species would soon become infested, and so the worst of them were taken up and burned, their places being filled again with healthy plants.

A thorough examination was then made of all the white pines, and wherever any sign of this pest was found the young tree was sprayed with a kerosene emulsion of medium strength. This removed all traces of the insect, and the stems soon showed a clean, healthy color. The young trees which were attacked were all in one place near the Harrietstown road. The large area of white pines planted on the ridge a half mile or so to the south was free from this evil. As this insect seems to confine its work to the white pine, the Scotch pines in the same plantation escaped, and show no sign of disease from this or any other cause.

The growth of the Norway spruce in this plantation has not been so encouraging. The plants, though alive, seem to stand still, or, at best, put on short leaders. In places, where the location is favorable, some of them make a promising appearance; but on the whole their behavior is disappointing. It may be that the soil is too poor and sandy; and, I noticed that on many of these plants (Norway spruce) the leaders were cut back by the spring frosts. As the use of this species in subsequent plantations has been attended by similar results we have decided to discontinue its propagation in our nurseries. At the same time, we have on hand in



Photo. A. Knechtel.

Plantation of Scotch pine made in 1902 with 4-year-old transplants 10 to 14 inches high. Photographed in 1906, the trees then averaging 6 feet in height.



Photo. A. Knechtel.

A young white pine, nursery stock, showing four years' growth. Note the growth made in the last two years. State plantation.

our nurseries 439,080 plants of Norway spruce, three and four years old, of which 100,683 must go to the planting grounds next spring, and hence we cannot discontinue its use until this stock is disposed of. It is hoped that by selecting sites where the soil is better adapted to this species it may develop a more satisfactory growth.

The large plantation near Paul Smith's was made in the spring of 1905. The species and quantities used were: 300,000 white pines, three years old, once transplanted, imported from the nurseries of J. Heins' Sons, Halstenbek, Germany; 25,000 Scotch pines, four years old, once transplanted, purchased from the Evergreen Nursery Co., Sturgeon Bay, Wis.; 20,000 white pines, four years old, once transplanted, from the nurseries of D. Hill, Dundee, Ill.; 5,000 Scotch pines, twenty to thirty inches high, from R. Douglas' Sons, Waukegan, Ill.; and 5,000 Norway spruce, four years old, twice transplanted, from the exhibition nursery maintained by this Department at the St. Louis Exposition; in all, 355,000 plants.

The plants imported from Germany cost six marks, seventy-five pfennig (\$1.62) per thousand, f. o. b. on steamer at Hamburg, and were entered at New York free of duty. But the ocean freight, express charges from New York, and cartage over the eight miles from Paul Smith's railroad station made an additional expense of \$1.03 per thousand. Hence this German stock cost us \$2.65 per thousand delivered on the planting grounds, or a little over one-fourth of a cent per tree. The stock bought in Illinois and Wisconsin cost more, so much so that we have discontinued purchases from American nurseries, and will in the future confine our planting to the output of our own nurseries; or, if that proves insufficient will supplement it with importations from Germany.

The cost of the labor in setting out the plants in the field is \$325 per hundred thousand, or about one-third of a cent per tree. Two men working eight hours can set out, on an average, about 1,500 plants in a day. So this plantation, or so much of it as is occupied by imported stock cost six-tenths of a cent per tree, including both the

purchase or propagation of the seedlings and the labor in setting them out in their final position; and it may be assumed that the expense per tree of subsequent plantations can be figured on this basis. The cost per acre, however, will depend on the spacing, or number of trees per acre, as will be explained further on.

That our foresting operations have thus far cost more than these figures indicate is due to the establishment of new nurseries, the high prices which we are obliged to pay for stock from American firms, the expense of filling blanks in two of our plantations, and the minor mistakes or failures incidental to experimental work under new and untried conditions.

In addition to the 355,000 nursling trees set out on the plantation near Paul Smith's in the spring, there were shipped from the State nurseries 193,000 more to the plantations made in the fall of that year at Chub Hill and at Ray Brook, making, in all, 548,100 trees used in our reforestation operations for 1905, not including plants used for filling blanks at other places.

At Chub Hill we used 65,000 white pines and 50,000 Scotch pines. At Ray Brook we used 61,000 Norway spruce, 5,000 Scotch pine, 5,000 white pine, and 7,000 European larch. The percentage of trees that died in these plantations was much larger than in any of our previous work, and was due, in my opinion, to fall planting. Our appropriation that year, as usual, did not become available until too late for the spring work, and, rather than carry it over to 1906, we decided to risk the experiment.

The stock used consisted entirely of four-year old transplants from our own nurseries, and in size and thrifty appearance were all that we could desire. But many of these little trees, weakened by the shock of removal from the nursery beds, were unable to withstand the wintry exposure that immediately followed and the severe frosts that occurred in the ensuing spring. Most of the dead plants at Chub Hill were replaced the next spring with live ones, and as the latter have lived and thrived it is evident that the failure of the



Photo, A. Kuechel.
Reforesting operations on waste land in the Adirondacks. Mattock men in the first row, planters in second row. The pails are used for carrying the little seedling trees.



Photo, A. Knechtel.

Reforestation by the seed spot method. Newly planted. Franklin County, N. Y.

others was not due to any lack of vitality or to the barren soil. I am aware that in some places, where the climate and other conditions are favorable, fall planting of seedling conifers has been successful; but if attempted on the Adirondack plateau the long, severe winter, followed by the usual late spring, will cause too large a percentage of failures. With this experience in mind we shall hereafter make our plantations in May.

In addition to the 548,100 trees set out in 1906, some work was done that year near Paul Smith's by the seed-spot method. Forty acres were planted in this way with seeds of white and Scotch pine. In 1906 about eleven acres more of spots were made in which the forester used seeds of Norway, white, native red, and Douglas spruce; also, some balsam and Norway pine.

The spots were made by hacking up the sod or soil with a mattock, exposing a small area of fresh ground twenty inches or more across, which was worked slightly to prepare it for the seed. The loose earth on the surface was then slightly firmed with the foot — an important and necessary part of the work — and eight to twelve seeds scattered over it, after which they were lightly covered with a handful of pulverized earth. The spots were made at spaces of six feet from centre to centre in each direction, though four feet would have been better. Hereafter we shall use the latter interval for plantations of this kind.

The germination was satisfactory, the spots, with few exceptions, showing from one to ten sprouts. In three or four years, when these seedlings have attained a suitable size, the most promising one will be selected for permanent growth, and the superfluous ones pulled up and thrown away. Of the latter, some will be transplanted in the nearest blanks.

It was noticed in our seed-spot work that the spruces showed the highest percentage of germination, contrasting favorably with the disappointing behavior of these species in our plantations where only the best nursery stock was used. This suggests that, while

spruce seedlings of natural growth will live and thrive in the shelter of our Adirondack forests, they may not do so well when exposed to the bleak winds and severe frosts that prevail on the open plains where we make our plantations.

The seed-spot method of reforestation is used to a considerable extent in Europe, especially in Saxony, and in our own work the indications thus far are so favorable that we intend to continue it on a more extensive scale. The cost for labor on a plantation made this way is substantially the same as one in which seedlings or transplants are used; but we avoid the expenses incurred in the maintenance of nurseries and propagation of stock. Furthermore, there is such a vast area to be reforested, and the appropriations for this purpose are so disproportionately small that we feel impelled, as a matter of economy, to use this method so far as practicable.

We did some broadcast sowing, also, in 1905, but it was confined to comparatively small areas, and was undertaken as experimental work rather than with an idea of getting satisfactory results. For this purpose seeds of white and Scotch pine were used. Before sowing they were coated with red lead or with a solution of blue vitriol to prevent the birds from eating them. No birds were poisoned through this precaution, as they evidently distinguished these seeds from uncoated ones and did not eat them.

Most of the pine sown broadcast near Paul Smith's did not sprout, although they may come up later on; but an area of a few acres near Ray Brook, which was also sown broadcast was thickly covered with young seedlings this summer.

The results, thus far, from our broadcast sowing have not been such as to encourage an attempt to do any extensive work of this kind. The germination, for the most part, is too uncertain or uneven. It would, undoubtedly, be highly successful if done on a field of freshly turned, well harrowed earth; but such a preparation of the ground would be more expensive than the use of nursery plants. For these reasons, in gathering our supply of seed this



Reforesting waste land in the Adirondacks. Broadcast sowing of tree seed on snow. Photo. A. Knechtel.



Underplanting white birch with coniferous species. Near Upper Saranac Lake, Franklin County, N. Y.
Photo. A. Knechtel.

year we limited the work to collecting only such species and amounts as were necessary for the seed beds in the State nurseries and for seed-spot plantations. As the Norway pines bore only a scanty supply of cones in 1906, we had difficulty in securing the few pounds of seed of this species required in our nursery work.

The only plantation of hardwoods undertaken as yet was made in 1904. The land selected for this purpose was a grassy field containing seventy acres, situated at Canoe Point on the lower end of Grindstone Island, St. Lawrence river. It is one of the numerous reservations owned by the State on the south shore of that river and maintained for the free use and recreation of the public. From a ridge of moderate height, the highest in the Thousand Islands, the land slopes evenly to the shore. It was set out with plants of broad-leaved species taken from a temporary nursery which the State was operating in the Catskills at that time. The species planted at Canoe Point consisted of red oak, pin oak, chestnut, black locust, black walnut, white ash, and hickory, 79,580 in all, mostly oak. A few acres of hardwood seedlings were set out at Cedar Point also, another one of the State reservations on the St. Lawrence.

Fully one-third of these plants were destroyed during the next winter by field mice, which, burrowing under the snow, gnawed the bark away or cut off the stem completely. When the damage was discovered measures were taken to poison the mice, and large quantities of corn meal mixed with strychnine were distributed over the field. The plants which escaped injury are now alive and doing well. As the cattle which previously pastured on this ground have been fenced out the grass grows so thick and high that the dead seedlings cannot well be replaced with plants of ordinary size. They would be smothered by the rank, tall grass. As soon as our proposed nursery for the propagation of hardwoods is established we will select large plants and use them for replacing the ones destroyed by the mice.

In 1906 we did comparatively little in the way of new plantations, and confined the work to extending the area of the ones already made. We could not, undertake anything further as our annual appropriation for reforestation was cut down one-fourth, and a large part of this fund was needed for the establishment of additional nurseries, without which we cannot do much planting and do it economically. Hence we bought no stock, and used only the output of our nurseries. A part of these plants were sent to the Chub Hill and Ray Brook plantations to make good the losses incurred by the fall planting done in 1905. Such, in brief, is a résumé of our reforestation operations for the last five years.

The question naturally arises here, How much does it cost per acre to make a forest tree plantation? The answer depends largely on the number of trees per acre which are set out, and that again on the spacing. If the plants are placed at intervals of six feet, in rows six feet apart, there would be 1,210 trees to the acre, assuming that there were no obstacles on the ground to prevent the planting of the entire area. By using stock from the State nurseries the plants will cost when set out in the fields half a cent on the average, including both the propagation and the planting, or \$6.05 per acre. But in planting a tract of several hundred acres the number of plants used, and the average cost per acre would be materially less because of the numerous small areas which cannot be planted owing to swampy or rocky conditions or to scattered thickets of second growth. The plantation at West Harriestown, made in 1902, was spaced at six feet for the greater part of the tract and cost between five and six dollars per acre. Subsequent work done with smaller intervals and a greater number of plants per acre cost proportionately more.

We intend to do our planting hereafter, to some extent at least, at five feet intervals. We shall adopt this spacing, however, for evergreen or coniferous species only. Where we undertake any reforestation with hardwoods or broad-leaved species we shall space

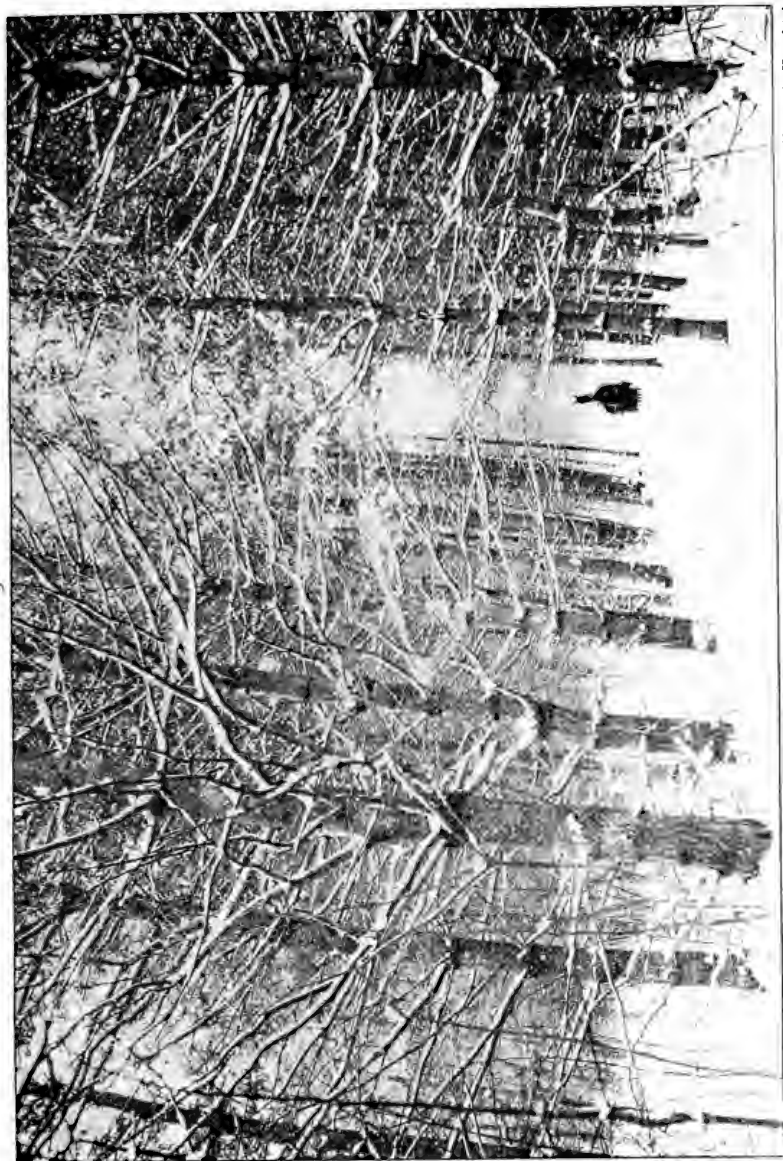


Photo. A. Knechtel.

Second growth white pine grown from wind sown seed.

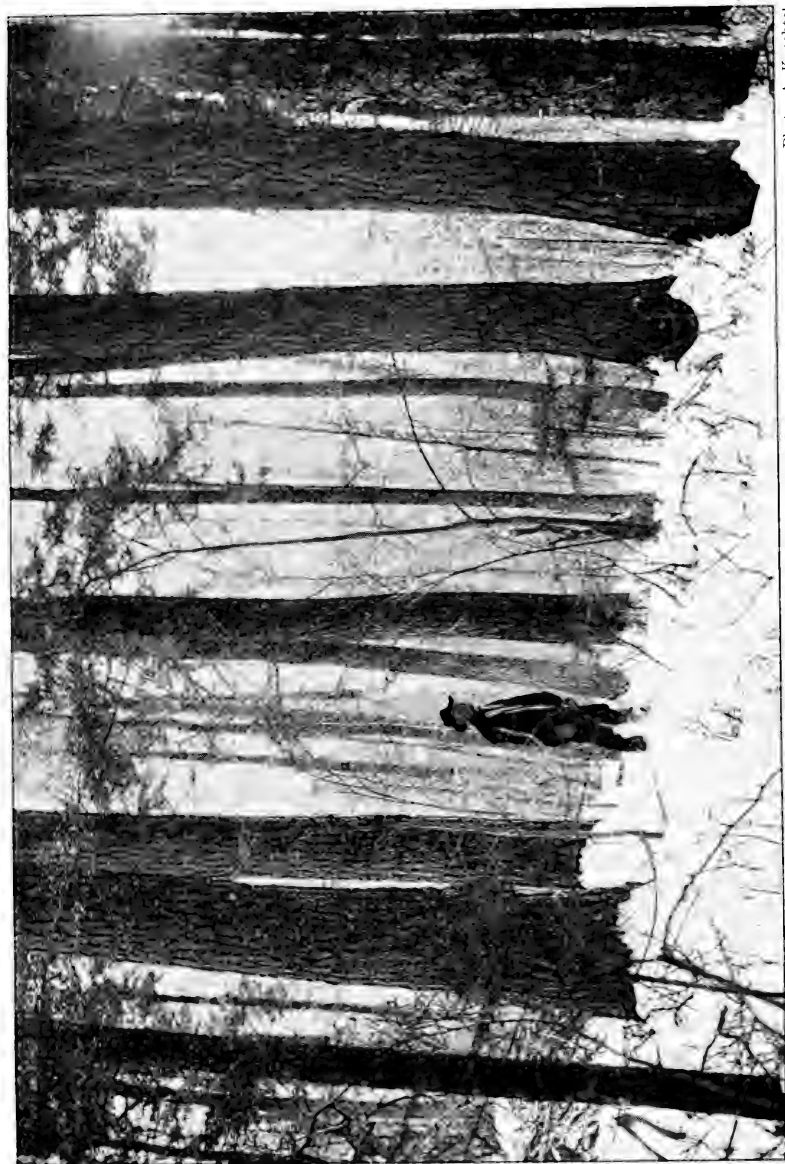


Photo. A. Knechtel.

Under the hemlocks. View in State forest near Sacandaga Lake, Hamilton County, N. Y.

them at intervals of seven feet or more. Pine and spruce have such a tendency to throw out branches all the way down to the ground that the young trees of such species must be crowded enough to force a proper height growth at the start, and, by bringing their crown covers together as soon as possible secure a density and shade that will induce them to shed the lower limbs. Our tree planting is done for the purpose of raising merchantable timber, trees of maximum height with clean trunks free from limbs. Such trees furnish the best logs and most valuable lumber. The shedding of the lower limbs, caused by crowding, enables the tree to take on wood clear of knots; then, having attained as great a height as possible by these means, it can be left to exert its energy in adding to its diameter. In Europe the foresters plant at intervals of four feet, and as a result a plantation of spruce or fir, twelve to fifteen years old, shows a thicket with interlocking tops that cut off the light from the lower branches.

In our own work we expect that after fifteen years or so thinnings will be made from time to time, and that the revenue from this source will reduce in some extent the first cost of a plantation.

One object in making regular intervals is to have the largest number of trees per acre at a given cost. Irregularity or carelessness in spacing would defeat this object. It has been pointed out in some text books that where trees are set out at the same intervals as the space between the rows — each at the corner of a square area — they would not be equi-distant in a diagonal direction, and would not have the same space in which to grow. For this reason triangular instead of square areas are advocated by some foresters, and in our plantation near Paul Smith's one field was laid out that way.

NURSERIES.

The forest department of the Commission maintains at present four nurseries for the propagation of forest tree seedlings for use in reforesting the waste lands belonging to the State. Each nursery has an enclosed area of two acres. Two of them are situated near

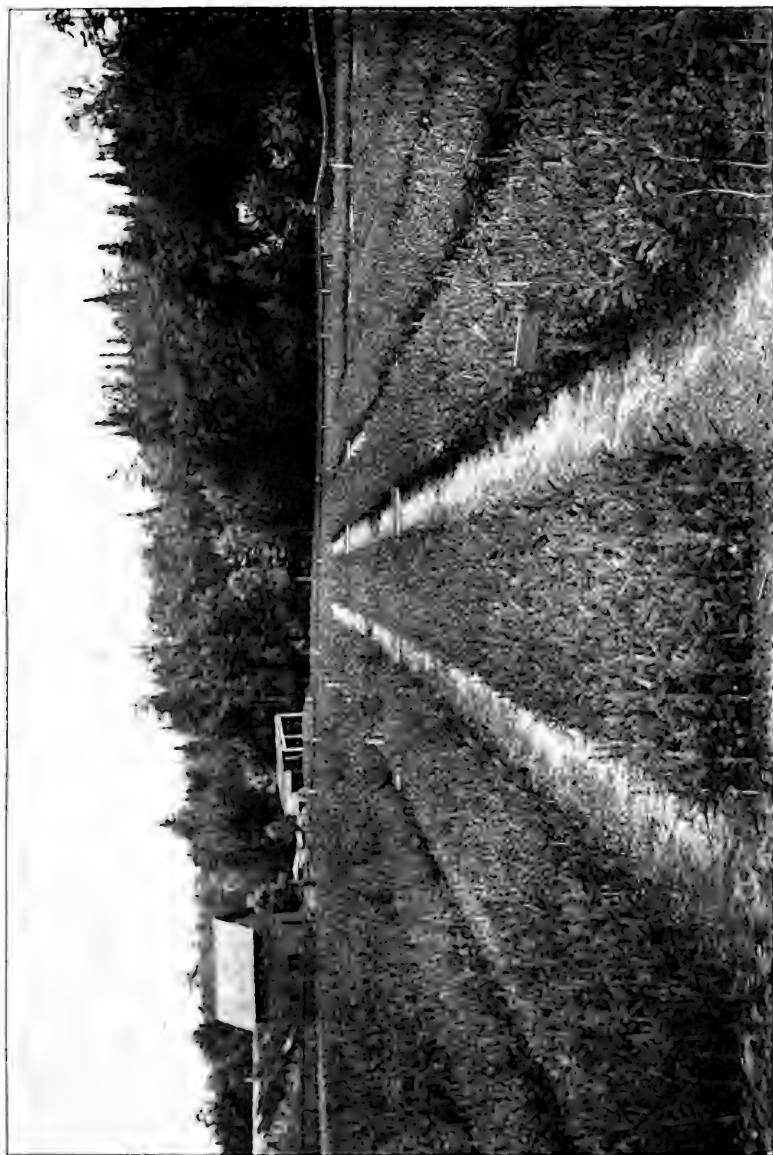
Saranac Inn railroad station; one at Wawbeek, on Upper Saranac lake; and one at Axton,— each in Franklin county.

With the exception of a nursery in the Catskills which was operated by the Commission for temporary purposes and then discontinued, the first one permanently established by this Department is located at Saranac Inn railroad station. The work in this one has been attended with highly satisfactory results, and its present condition is all that any forester could desire. During the past season the beds and paths presented a neat, orderly appearance, without a weed in sight, the seed beds show a maximum density of growth, and the transplant beds are filled throughout their entire extent with healthy, thrifty stock of good height.

This nursery has a complete system of water pipes and hydrants for sprinkling the plants in times of drought, the supply coming from a large tank located on a hill near by. The tank, which is well housed, is kept full by a hydraulic ram placed in the outlet of Little Clear Pond near the nursery. A neat, paling fence, painted green, surrounds the enclosure, and the tank house, tool house and forester's office are painted the same color.

This site was selected because there was a railroad station close by affording shipping facilities, and on account of the areas of waste land to be reforested which are situated within a day's haul or less. There was no tree growth of any kind on the ground and so no expense was incurred for clearing the land; but it was covered with a thin, tough sod on which there was considerable quack grass that had to be dug out thoroughly before plowing.

The earth was entirely free from stones, or even small pebbles, a desirable condition; but the soil was very sandy, and, though favorable on that account for the growth of pines, it lacked the fertility necessary for general nursery purposes. To remedy this we used a large amount of fertilizing material. Several carloads of horse manure, purchased at lumber camps, were shipped in by rail, and scattered over the ploughed ground before the first snowfall. Some



Beds of Norway spruce, 4 year-old transplants, in a State nursery. View taken just before the removal of this stock to a field plantation.

Photo. A. Knechtel.

of the manure was reserved and used in making compost piles for future use.

Our principal reliance, however, was placed on a liberal use of black muck in making the beds, which is valuable for retention of moisture, although of doubtful value as a source of plant food. A rich deposit of this material was found at a place four miles away, and after letting a contract for its excavation it was piled in a large heap by the side of the adjoining highway to dry. When freshly dug this muck was so wet and heavy that hauling it on wagons would have been too expensive, and so it was moved on sleighs the next winter. A chemical analysis of this forest muck calculated on a basis of dry matter showed:

*Organic matter.....	67.41%
Nitrogen.	1.21%

The important constituents in muck are the organic matter and the per cent. of nitrogen. In this case the organic matter has a high percentage, while the proportion of nitrogen is about normal. There is always a little phosphoric acid, and still less potash, but so small in amount as to be insignificant in passing on the value of a muck. Where practical it is well to use a little lime with the muck as was done when the ground was first prepared. To neutralize any sourness or acidity in the muck a liberal quantity of hardwood ashes, unleached, forty bushels per acre, was worked into the beds. The ashes served as a fertilizer, also, for this material contains all the elements essential to plant growth except nitrogen, the lack of the latter being supplied by adding a proper quantity of nitrate of soda. By these means a barren, sandy soil was rendered highly fertile, and the dry, dusty surface converted into ground of desirable consistency.

This nursery is operated for the propagation of coniferous species only, pine, spruce, and larch. Of the various kinds of

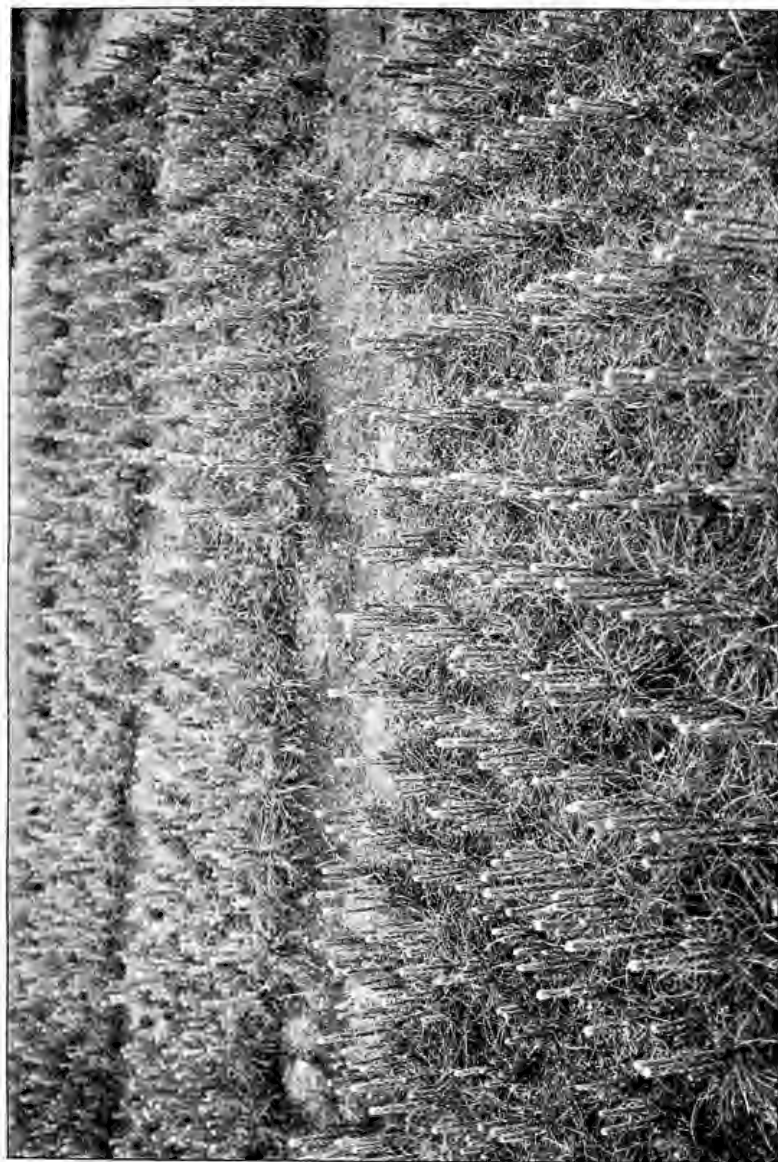
*Analysis by Prof. George W. Cavanaugh, College of Agriculture, Ithaca, N. Y.

pine, we are raising white, red (Norway), and Scotch; of the spruce, Norway and our native red spruce; of larch (tamarack), preference is given to the European species. We have some beds of Douglas spruce and bull pine (*P. ponderosa*), but as these species are used sparingly in our reforestation operations they will be given a place hereafter in another nursery recently established for experimental work. The Norway spruce did surprisingly well in the nursery beds, but so poorly in the plantations that we intend, as already mentioned, to discontinue its use and confine our planting, for awhile at least, to the three pines. This cannot be done, however, until we have used up the large stock of spruce which we still have on hand.

The arrangement of the beds and paths is the same as in the best European nurseries. The transplant beds are four feet wide, fifty feet long, and raised four inches above the paths. A wagon road divides the enclosure equally in one direction and a broad foot path in the opposite one. The foot paths between the beds are narrow, but wide enough to permit the use of a wheelbarrow.

The seed beds are few in number and occupy only a small part of the enclosure, for one bed of this kind will furnish the seedlings for a large area of transplant beds. The seed beds are twelve feet long and four feet wide, and are made of carefully prepared earth. They are protected on the sides and ends by a framework of boards eight inches wide, placed on edge. These boards are pressed into the ground until they project about six inches above the level of the bed. Large openings made in the boards on the sides and ends, covered with wire netting, allow a free circulation of air and lessen materially any tendency in the plants to damping off.

Before planting a seed bed the ground is thoroughly moistened, after which the surface is slightly firmed, and then the seeds are sown broadcast as evenly as possible. For the latter purpose, three-fourths of a pound of white pine seed is used on a bed four by



Beds of Norway pine, 3-year-old transplants, in a State nursery. View taken in spring of their fourth year.

Photo. A. Knechtel.

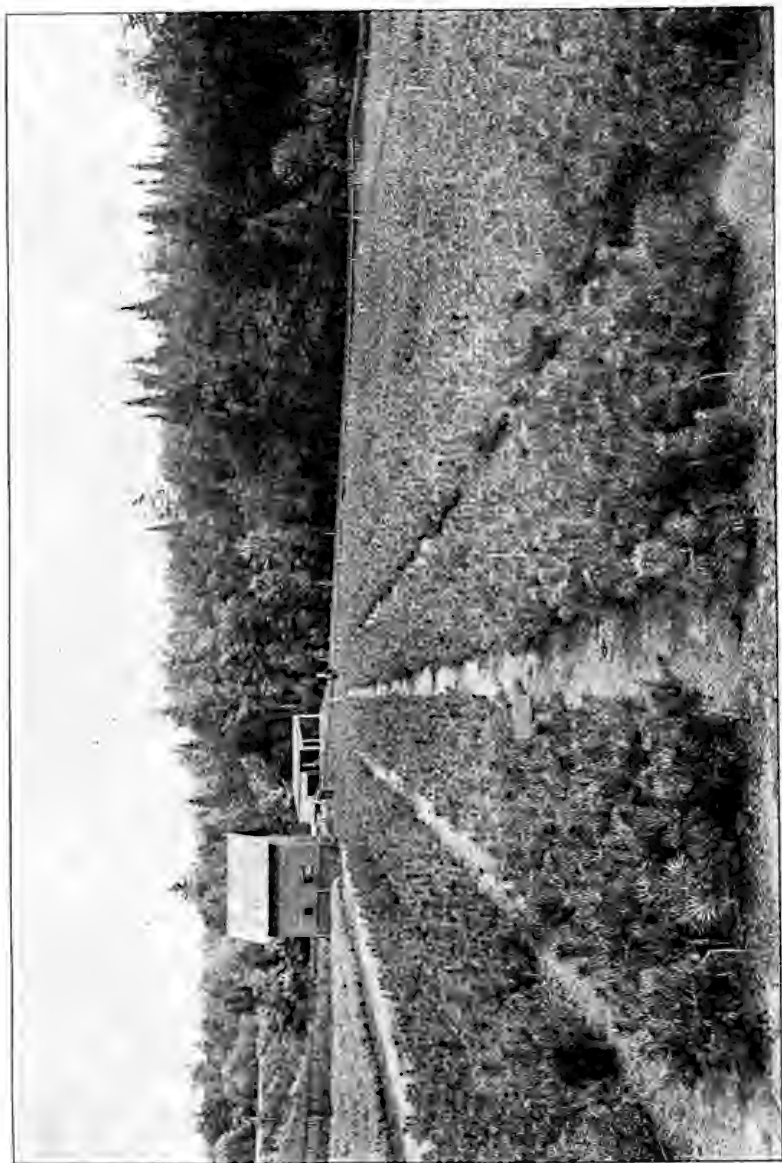


Photo. A. Knechtel.

Beds of Scotch pine in a State nursery. Four-year-old transplants ready for removal to plantation.

twelve feet; and half a pound of Scotch pine, red pine, or Norway spruce. The seeds having been sown they are lightly covered, not over one-eighth of an inch, with fine earth sifted through a hand screen. Any thicker covering will retard germination and increase the liability of failure. If the work is properly done the sprouts will appear in fourteen days or thereabouts, the larger seeds of the white pine germinating somewhat later.

When a bed is sown it is covered immediately with a wire screen of small mesh to keep out the birds and squirrels which, otherwise, would eat the seeds. Then a lath screen for shade, with open spaces just the width of a lath, is laid on, with its frame resting on the edges of the boards that enclose the bed. As both the wire screen and the lath shade are made as light as possible, they can be lifted and removed quickly whenever it is necessary to examine the germination closely.

As soon as the seeds are sown the open spaces in the lath screen are closed with loose lath, and the openings in the sides and ends of the board frames are covered with heavy brown paper to exclude the light. In this way the bed is kept dark until the sprouts appear, a humid condition is maintained, and any sudden change in temperature is avoided. In my opinion the remarkably high percentage of germination in our seed beds is due largely to this precaution.

When the surface of the bed is fairly well covered with the tiny sprouts the loose lath in the shade frames and the paper on the sides of the boxing are removed, admitting light and air.

Our seed beds are laid out east and west, so that there will be a moving light and shade below the lath screens, making an even exposure along the entire surface. At the end of the season the seedlings cover the bed with an even, green mat that hides the ground completely and prevents the growth of weeds. In such of our seed beds as are sown broadcast we save the expense of weeding, but in those where, for experiment, we sow the seed in drills six inches apart we have to do considerable weeding; and

the latter work forms one of the principal items of expense in the maintenance of a nursery.

At the end of the first year the lath and wire screens are removed, and the boxing taken up. During the second season the seedlings, now known as two-year olds, attain an average height of four inches and show a dense mass of young foliage that has to be separated by the hands in order to get a glimpse of the ground in which they are growing.

The two-year old seedlings are now ready for removal to the transplant beds, where they are reset and remain two years more. Some careful work is necessary in taking up the plants in a seed bed, especially if it was made by broadcast sowing. The tender roots are intertwined and tangled to a much greater extent than if the seed were sown in drills. For this reason many foresters prefer to plant their seed beds so that the seedlings will be in rows six inches apart, despite the extra expense incurred thereby for weeding and the loss of moisture by greater evaporation from the exposed surface. But with an exercise of proper care the seedlings can be removed from a broadcast bed without injury. Beginning at one end of the bed the workman pushes a sharp spade into the ground below the roots and then with an upward, prying movement breaks up the earth until the seedlings can be loosened by hand. The dirt is shaken off, after which the roots are easily and quickly disentangled without injury. If some of the long roots are cut off by the spade no harm is done. Many expert nurserymen make a practice of trimming the long slender roots before the seedlings are placed in the transplant beds.

As fast as the seedlings are taken up from the seed beds they are carried immediately to the transplant beds where they are set out four inches apart in rows running across the beds. The rows are placed six inches apart. The rows in the transplant beds could run lengthwise, and this is done in some nurseries; but for convenience in weeding we make our rows crosswise.

In setting out the two-year old seedlings in the transplant beds a planting board is used, four feet long and six inches wide. Notches are cut in the edge at intervals of four inches, and the holes in the bed in which the seedlings are planted are made at these notches. By this method we obtain a regularity in the rows both ways, which is conducive to a proper growth and attractive appearance. When the seedlings have remained two years in the transplant beds they are ready for the plantations. They are then called four-year old transplants and are from fourteen to eighteen inches in height. The expense of removing two-year old seedlings into the transplant beds is a trifle over one dollar per thousand.

The reason for transplanting in a nursery is that the seedlings develop a better root system as a result of this process, and hence make a better growth when sent to the plantations. No time is lost as the little trees grow as fast in the transplant beds as in the field. We could use three-year old transplants in our work; but having incurred the expense of transplanting them in the nursery they may as well remain the additional year. The only additional expense is the weeding.

I am aware that in some European countries the foresters use two or three-year old seedlings raised in seed beds, and which have not been transplanted. But this is feasible only on ground which has been prepared at considerable expense, or on land that offers favorable conditions. In our Adirondack work we have to contend with unfavorable conditions that necessitate the use of large four-year old transplants. The soil is burned to the sand or quite sterile, and so only strong large plants can make a start. Moreover, the ground to be planted is, in most places, overgrown with ferns, huckleberry bushes, weeds, and briars, that smother the growth of anything less than a four-year old transplant. We have had some experience in the use of two-year old seedlings for field work and much of it has resulted in failures.

The Department is operating also a nursery at Axton, and one at Wawbeek, both in Franklin county. They are used for the propagation of coniferous species only. These two nurseries were established by the Cornell Forestry School, but were abandoned when the work of that institution was discontinued. Part of the stock had been removed, after which for three years these nurseries were neglected and allowed to grow up to weeds. Still considerable stock remained, especially in the seed beds, and rather than allow it to become a loss we decided to re-establish these nurseries and utilize these plants.

This was done at considerable expense, not only for transplanting the seedlings but in clearing out the wild growth which had taken possession, and in keeping down the rank weed growth which appeared immediately in the newly-made beds. Another unfavorable feature was the large proportion of Norway spruce left by the college management, the use of which we prefer to discontinue.

We intend, however, to operate the Axton nursery as a temporary arrangement only, and abandon it as soon as the stock now there is large enough to go to the field plantations. But the one at Wawbeek should be maintained as a permanent nursery, and as soon as the Norway spruce now there has been used it should be devoted to the propagation of white, Norway and Scotch pine; also larch, to a small extent.

This nursery is well located, on the highway running from the Wawbeek Hotel, on Upper Saranac lake, to Tupper Lake railroad station. It is situated in a high forest, contains something over two acres, and is surrounded by a good wire fence. The soil is composed of the original forest humus underlaid by a rich, black earth, and owing to the shelter of the adjoining forest and moist conditions will not require any irrigation plant. At present the soil is so heavy and stiff that it is not worked easily, and weeding by hand is somewhat difficult. A liberal application of hardwood ashes or sand may be necessary to reduce the earth in the beds to a desirable condition.

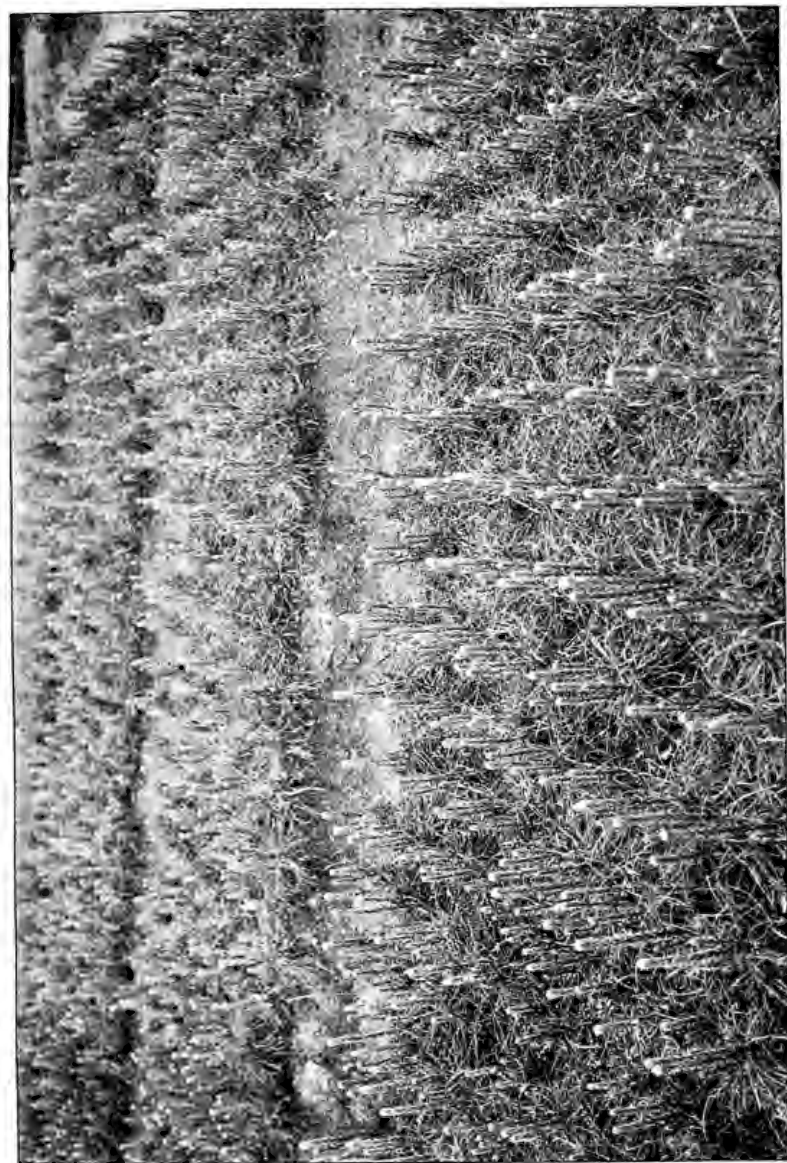


PHOTO. A. KINCHITEL.
Beds of Norway pine, 8-year-old transplants, in a State nursery. View taken in spring of their fourth year.



Seed beds in a State nursery showing lath screens for shade, and wire screens for protection from birds.

Photo. A. Knochel.

In 1906, at the suggestion of the United States Forest Service, at Washington, D. C., an arrangement was made for the establishment and maintenance of a co-operative nursery, one-half the expense to be borne by that Department. A site of two acres was accordingly selected on the small plateau at the top of the hill just east of the Saranac State Hatchery. The woods were cleared, the ground ploughed, and the area was planted with peas, preliminary to making the beds. One acre was then enclosed with a neat substantial wire fence to keep out the deer which had already done some damage to the seed beds. Transplant beds will be made next spring and filled with two-year old seedlings from the Saranac Inn Nursery, where we happen to have a large surplus in the seed beds.

This co-operative nursery will be maintained largely for experimental work in the propagation of various untried species, a class of work which we cannot well undertake in our other nurseries, as their capacity is insufficient to furnish the kinds of stock needed for our reforestation operations. A part of this enclosure will be set apart for raising hardwood or broad-leaved trees, and an attempt will be made to introduce on the Adirondack plateau certain nut bearers—oak, chestnut, and hickory—which cannot be found there now except on the low altitudes of the surrounding foot hills.

At present the seed beds in the Experiment Nursery contain the following species: Silver, sugar, Jeffrey, white, Austrian, bull, Scotch, Norway, and jack pine; white, red, Norway, and Douglas spruce; incense cedar; California white fir; European larch; and native balsam. The coniferous species occupy 36 seed beds, 4 by 12 feet each. The hardwoods, sown in drills, include the following: Basswood, honey locust, common locust, mocker nut hickory, black walnut, butternut, box elder, chestnut, and horse chestnut. Other species will be added this coming spring.

All seed beds in this enclosure are sown broadcast except one of Norway pine and one of Scotch pine, which were sown in drills four inches apart to test some questions as to the best way of

making a seed bed. Experiments were made to ascertain the proper density of seedlings. Five beds of Scotch pine were sown with the following amount in each: One bed with one-fourth of a pound of seed; one with three-eighths of a pound; one with half a pound; one with five-eighths; and one with three-fourths of a pound. When these seedlings are two years old we may get some idea as to the quantity of seed per bed necessary to the best results:

The expense of this nursery thus far is:

Labor in clearing and cleaning land.....	\$39 25
Plowing and hauling off brush.....	88 00
Labor, 1,012 hours, at 22c.....	222 64
Wire and posts for fence.....	28 56
Bed frames, lumber and freight.....	24 47
Wire screens for seed beds.....	44 00
Seeds	25 05
Peas, 14 bushels	28 34
Insecticides and fungicides	30 39
	<hr/>
	\$530 70
Less amount received from U. S. Forest Service...	200 00
	<hr/>
	\$330 70
	<hr/>

The transplant beds, which will be an additional expense, will be made in the following spring, and will be stocked with seedlings from the Saranac Inn Nursery. Some of these beds will be set apart for an experiment in the use of one-year old seedlings as transplants.

The stock of four-year old transplants now on hand in the State nurseries and available for the spring planting in 1907 is:

Saranac Inn Nursery:

White pine.....	85,370
Scotch pine	4,716

Norway pine.....	36,288
Bull pine	5,627
Norway spruce.....	8,605
Douglas spruce.....	1,000
European larch.....	4,000

Wawbeek Nursery:

Norway spruce.....	55,800
White ash	300
Arborvitae	900

Axton Nursery:

Norway spruce.....	46,278
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Co-operative Experiment Nursery:

Black locust	3,000
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Total.....	251,884
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Stock by species:

White pine	85,370
Scotch pine	4,716
Norway pine.....	36,288
Bull pine	5,627
Norway spruce.....	110,683
Douglas spruce.....	1,000
European larch.....	4,000
Arborvitae	900
White ash	300
Black locust	3,000

Total.....	251,884
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Stock furnished by each nursery:

Saranac Nursery	145,606
U. S. Experiment Station.....	3,000
Wawbeek Nursery.....	57,000
Axton Nursery.....	46,278
<hr/>	
Total.....	251,884
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This comparatively small output is due to the fact that the Axton and Wawbeek Nurseries were not re-established until last year (1906), and that the United States Co-operative Nursery is still lying fallow with the exception of the seed beds.

In addition to the stock described above as available for the spring planting in 1907, there is a much larger quantity of one, two, and three-year old plants which will be ready for the field plantations later on.

I take this opportunity to recommend the establishment of a nursery for the propagation of hardwood or deciduous species. As we expect to abandon the one at Axton within two years the number of nurseries will not be increased by this proposition. This hardwood nursery should be located in the Catskills, preferably in the valley of the Esopus creek and near some station on the Ulster and Delaware railroad.

The State has now over 100,000 acres in the Catskill Preserve and these areas will be increased largely each year by further purchases. Some of these lands are sparsely covered with forest growth and can be greatly improved by underplanting with merchantable species, while other portions, consisting in part of abandoned farms or cleared land, should be reforested with nursery stock. We started a nursery in the Catskills four years ago, at a place about two miles from Brown's Station. The site, which was selected without consulting the superintendent, was an unfavorable one, on a hill farm, and the gravelly, stony condition of the soil

made its operation difficult and expensive. It was abandoned with the intention of selecting a better site somewhere on the fertile bottom land of the Esopus valley, but for lack of funds nothing has been attempted yet to carry out this plan.

In asking for appropriations to carry on our nursery work and tree planting we are often confronted with the question, why not let these lands grow up to trees and reforest themselves naturally? In reply we point out that the waste lands in the Adirondacks do not always reforest themselves naturally. The Indian Plains on the south branch of the Moose River are entirely devoid of woody growth, and were so described in the field notes of John Richards when he surveyed that township ninety years ago. The Mineral Plains, a treeless expanse of several hundred acres near Cranberry Lake, were in that same condition in 1772 according to the field notes of Archibald Campbell, one of the colonial surveyors who located the great Totten & Crossfield Purchase. Near the Red Horse Chain, on the trail to Witchhopple Lake, is a large opening in the forest where the ground is covered only with ferns and has always been so as far back as the oldest guide and hunter in that locality can remember. Surveyor O'Hara, in 1791, described an Indian cornfield of 100 acres or more, in Arthurboro Patent, Hamilton county, and this field is still bare of trees, or even shrubs. The burned lands and sandy plains in West Harrietstown, near Lake Clear Junction, remained for many years in a denuded condition until they were reforested by the State.

Let it be conceded, however, for the sake of the argument, that the waste and barren lands in the Preserve will in time reforest themselves naturally. But in such a case the tree growth will be composed largely of worthless material and unmerchantable species. The wild forest that will take possession of the land is not worth one-tenth the cultivated one that could be established there. The primeval forests of the Adirondacks, at their best, have only yielded about 4,500 feet of soft wood timber on an average, the remainder

being unmerchutable. But our planted forests when fully grown will cut 40,000 feet of pine per acre. A wild forest, with its haphazard, undesirable growth, will increase but little, if any, in value, for there is none in it to start with; but a planted forest, every tree a pine or spruce, will increase in value with every rise in the price of lumber. Our people want wood, need wood, and must have it. It is the mission of the forester to grow wood and thus make provision for this ever increasing demand.

FOREST FIRES.

In the year 1906, the period covered by this report, the loss of standing timber by fire in the Adirondack and Catskill forests was comparatively small. While in some of our Northern States there were widespread destructive fires in their forest districts, the State of New York was exempt in a fortunate degree. This was not due entirely to favorable weather conditions or a wet season. The rainfall was slightly below the normal, and at one time last May there was a period of drought during which it was deemed necessary to order out patrols. Many fires started up at this time along the railroads, but they were extinguished promptly by the firewardens before any damage was done.

On the forest lands belonging to the State 292 acres of timber were destroyed and 1,026 acres of waste or brush land were burned over. The latter was covered for the most part with ferns or huckleberry bushes and the sandy soil had been bare of humus for many years.

On private lands, in the Adirondacks, timber on 1,376 acres was destroyed or damaged, and 4,266 acres of brush or meadow land were burned over.

In the Catskills no fires occurred on State land; but timber on 2,535 acres was damaged, and the ground fires ran over 3,005 acres of wild meadows and brush lands. A compilation of the figures obtained from the reports of the various town firewardens indicates that the loss in standing timber amounted to \$2,715 in the Adirondacks,

and \$5,620 in the Catskills. I think, however, that the firewardens in many instances overestimated both the area burned and the amount of damage, especially in the Catskills. This was evident from the statements of the chief firewarden who in some of these cases, after reading the firewarden's report, made a personal examination of the burned territory. Furthermore, only a small percentage of the trees were consumed by the flames. By far the greater part were slightly charred, and, though killed by the heat, were still valuable for fuel, and, to a considerable extent, for lumber or other purposes. But the firewardens reported most of the scorched timber as a total loss.

In all there were 98 fires in the Adirondacks, and 44 in the Catskills. With the exception of a few that caused the damage here reported, they were attacked without delay and extinguished before they reached any standing timber.

In the Adirondacks there were 1,294 acres less of timber burned than in 1905; but 1,750 more of brush, or fern growth. In the Catskills there were 410 acres more of timber burned than in 1905; and 1,110 more of waste land.

The largest fire in the Adirondacks occurred May 19, in the town of Greig, Lewis county; it burned 200 acres of timber and spread over 600 acres of waste land. It was started by some incendiary, in the opinion of the firewarden, but all efforts to detect the criminal were fruitless.

The most destructive one in the Catskills occurred April 21, in the town of Lumberland, Sullivan county; it damaged 450 acres of timber and 50 acres of brush land. The loss in timber was estimated at \$2,000. This fire was started by some children who were playing in the woods.

The number of fires in all — including incipient, slight, harmless or otherwise — in each county were:

<i>Adirondacks.</i>	
Clinton county.....	I
Essex county.....	16

Franklin county.....	11
Fulton county.....	2
Hamilton county.....	12
Lewis county.....	7
Oneida county.....	3
Saratoga county.....	5
St. Lawrence county.....	4
Warren county.....	37
	<hr/>
	98
	<hr/>

Catskills.

Greene county.....	3
Delaware county.....	12
Ulster county.....	6
Sullivan county.....	23
	<hr/>
	44
	<hr/>

The number of fires, large, small, incipient, or otherwise, in each month were:

April	49
May	51
June	3
July
August	12
September	13
October	3
November	11
	<hr/>
	142
	<hr/>

The causes, as reported by the firewardens were:

Railroad locomotives	20
Tobacco smokers	14
Fishermen	14
Hunters	8
Campers	6
Supposed incendiaries	11
Clearing land	9
Children at play	4
Berry pickers	2
Bee hunters	1
Imbecile	1
Burning house	1
Unknown	51

142

The fires caused by tobacco smokers were not due to cigar stubs or ashes from a pipe so much as to the careless habit of these people in throwing down lighted matches in the dead leaves on the ground. The great decrease in the number caused by farmers who were burning brush — at one time the most prolific source of forest fires — is due to the rigid enforcement of the law prohibiting the burning of fallows during certain months in the spring and fall. Still, there were 25 violations of this law, each of which was prosecuted by the chief firewarden and a conviction obtained. The fines imposed in these cases by the local justices varied from \$20 to \$100, and amounted in all to \$493. In four other cases the defendants were acquitted; and one case is awaiting trial.

With the constantly increasing number of people in the Adirondack and Catskill districts there is a corresponding increase in the number of forest fires started. It is well to consider here the direful results that would have ensued from the 142 fires mentioned here had there been no organized force to extinguish or fight them.

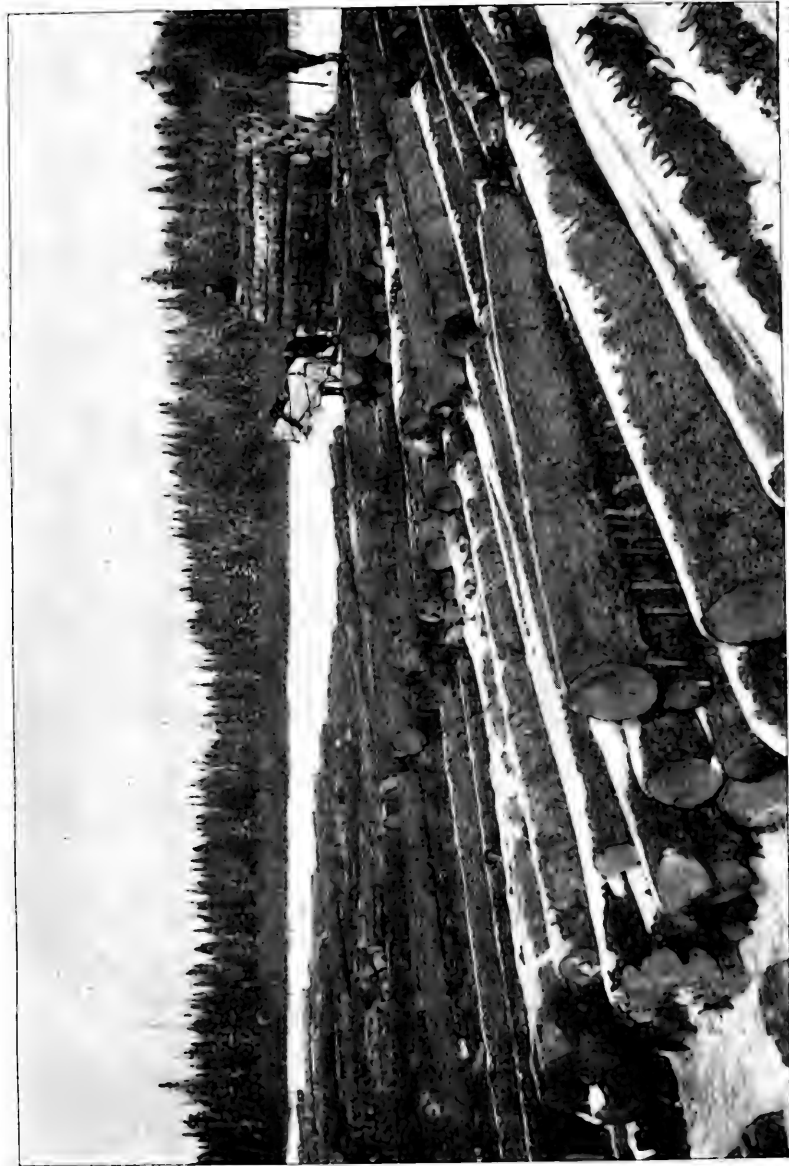
In fighting these fires there were 1,021 days' labor expended in the Adirondacks, and 982 in the Catskills. The cost to the State, including all other expenses incurred by the firewardens, was \$2,-949.13. A part of this sum was expended in the prevention of fire,—for the payment of patrols, posting of the “Rules and Regulations” along forest roads and trails, and services of firewardens superintending the burning of fallows where permits had been issued. Of the 131 forest towns there were 71 in which no fires occurred, and in which no expenses were incurred for any purpose.

FOREST PRODUCT OF NEW YORK.

But few people ever think of the Empire State as one of the forest States of the Union. Its far famed pre-eminence rests on its great cities, large population, railroads, canals, navigable rivers, productive farms, and diversified industries. And yet, according to the twelfth census 39 per cent, of its area is in woodlands. It includes not only the mountain forests of the Adirondacks and Catskills, but also large wooded areas in other parts of the State, while, on most of the farms there are productive wood lots. The annual product of these forests and woodlands attains an amount that gives New York a place among the lumber producing States, contributes materially to its wealth and industrial development, and constitutes an important factor in the forestry question that is now engaging everywhere the attention of thoughtful men and women.

This percentage of area in forest and woodlands (39 per cent.) as given in the last U. S. census is evidently too large. If added to the area of farm land as stated by the same authority it would exceed greatly the total area of the State. The only way the discrepancy can be reconciled is by assuming that this 39 per cent. of area includes wild or brush land already included in the farms. In our calculations we are unable to find over 27 per cent, of forest and woodlands.

In order to formulate an intelligent forest policy and conserve the interests dependent on our forest resources it is highly necessary that we should know, not only the extent of such resources, but how



Photo, A. Knechtel.

Banking ground for logs at Elm Lake, in the Adirondacks.



fast these are being depleted. To this end we have devoted considerable time each year to the compilation of statistics showing the actual amount of timber that is being cut for lumber, wood pulp, cooperage, chemicals, furniture, and maintenance of various other industries that obtain their supply of raw material from our forests and woodlands. We undertook this work in 1891 and since then have made an annual report of the same. The steady increase each year demands serious consideration, for with this constantly growing demand there is a corresponding decrease in the supply. The annual increment of growth in the remaining trees is so small in comparison with the removal of timber that it is a negligible factor in the question. Furthermore, it will be many years before the re-foresting operations conducted by the State will assume proportions that will in any great degree offset the annual loss.

It is necessary to state here that the great increase in our forest output, as shown in the following statistics for 1905, is due to the fact that in previous years we compiled returns from the Adirondack and Catskill forests only, and did not obtain the product from the small mills in other parts of the State. We were unaware until recently that these out-lying woodlands, much of them in the farming districts, were producing lumber and other wood material to any considerable extent. Having decided, however, to make our statistics as complete as possible, and inclusive of the entire State, we submit here figures showing the entire forest output of New York, based on the written returns furnished from the office of each mill, factory, or industry consuming logs obtained from the forests and woodlands within our borders. To this end, and in order to secure accuracy, each firm or individual was cautioned in our printed instructions to omit all stock obtained from Pennsylvania or Canada.

The statistics given here are for the output of 1905. As explained in our previous reports we cannot give the figures for the current year, 1906, because the returns cannot be obtained in time for our annual report.

Product of the forests and woodlands in the State of New York
for the year 1905:

LUMBER.

SPRUCE.

	Feet, B. M.	Feet, B. M.
Adirondack counties.....	203,589,532	
Catskill counties.....	2,933,393	
Farming counties.....	4,553,549	
	<hr/>	211,076,474

HEMLOCK.

Adirondack counties.....	73,051,932	
Catskill counties.....	23,504,688	
Farming counties.....	82,993,198	
	<hr/>	179,549,818

PINE.

Adirondack counties.....	59,838,239	
Catskill counties.....	12,530,468	
Farming counties.....	39,701,244	
	<hr/>	112,069,951

HARDWOOD.

Adirondack counties.....	78,817,818	
Catskill counties.....	41,250,682	
Farming counties.....	127,515,722	
	<hr/>	247,584,222

PULPWOOD.

Adirondack counties — 536,580 cords — equivalent B. M.....		294,582,420
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ROUNDWOOD.

(For Cooperage, Excelsior, Wood Alcohol, etc.)

	Feet, B. M.	Feet, B. M.
Adirondack counties — 51,040 cords —		
equivalent B. M.....	28,020,960	
Catskill counties — 129,351 cords —		
equivalent B. M.....	70,914,879	
Farming counties — 124,356 cords —		
equivalent B. M.....	68,271,444	
	<hr/>	167,207,283
Total		<hr/> <hr/> 1,212,070,168

Shingles	53,374,000
Lath	67,908,300

SUMMARY.

PRODUCT BY LOCALITIES.

	Feet, B. M.
Adirondack counties.....	737,900,901
Catskill counties.....	151,134,110
Farming counties.....	323,035,157
	<hr/>
	1,212,070,168
	<hr/> <hr/>

PRODUCT BY INDUSTRIES.

	Feet, B. M.
Lumber	750,280,465
Pulpwood	294,582,420
Roundwood	167,207,283
	<hr/>
	1,212,070,168
	<hr/> <hr/>

PRODUCT BY SPECIES.

	Feet, B. M.
Spruce	476,200,652
Balsam	29,458,242
Hemlock	179,549,818
Pine	112,069,951
Hardwoods	414,791,505
	<hr/>
	1,212,070,168
	<hr/>

The amount reported as consumed for pulpwood includes some balsam, estimated at ten per cent. Of the 84 pulp mills in this State, three of them use poplar almost exclusively. These three mills make a pulp which is used in the manufacture of a high grade of paper needed for books and magazines, and for which spruce is not available. In making calendered paper a large proportion of rags is necessary, and poplar is the only species of wood that can be used as a mixture with good results.

In the classification of the product by localities the term "Farming counties," includes the entire State outside the twelve Adirondack and four Catskill counties.

The term "roundwood" includes not only logs, but also the largest of the round branches which are used in the manufacture of wood alcohol, furniture, excelsior, and for fuel in brick kilns. As the material for these industries is to a large extent cut into four-foot lengths the mills make their returns in cords instead of logs, and it is impossible to separate the smaller wood from the logs.

The amount of shingles reported are made from logs cut, or set apart at saw mills, for this purpose. Shingle makers estimate that one thousand feet of logs will make from 8,000 to 10,000 shingles, the estimate varying according to the quality of the logs, and the length of the shingles — sixteen or eighteen inches. The figures given for the total output may therefore be increased accordingly. A large proportion of the shingles made in the Adirondack counties are



Photo by A. Krochmal

View in piling ground of sawmills at Tupper Lake, Franklin County, N. Y.





Photo. A. Koeddel.

Log Drive on the Boreas River, Essex County, N. Y.

cedar, and this fact should be noted in connection with the classification by species.

The term hardwoods used in these statistics includes several of the broad leaved or deciduous species. Thus far we have omitted any subclassification under this general head because many of the mills had not kept any such record of their hardwood logs. Some of the mill owners intimated that they did not want to be bothered by attempting a further addition to their returns, and as their responses to our requests for information are entirely gratuitous, it did not seem advisable to press the matter. We are able, however, to arrive approximately at the proportion of species embraced under the reports of hardwoods from our knowledge of the standing timber and forest composition in the localities whence these mills obtain their logs. The hardwoods cut by the Adirondack mills are confined to birch, maple, beech, and basswood, and in this order as to quantity. There is also a very small proportion, but very small, of elm, cherry and ash. There is no oak, chestnut or hickory on the Adirondack plateau. But the hardwoods sawed in the mills throughout the rest of the State include a large proportion of the latter species.

The 112,069,951 feet of pine reported is almost exclusively white pine, especially so in the Adirondacks. In other parts of the State there are small quantities of Norway, pitch and yellow pine, but if cut they did not probably exceed five per cent. of the total output of pine. The tamarack (American larch) grows freely in some parts of the Adirondacks, especially on low swampy lands, but as yet it is not used in the sawmills to any noticeable extent. It is cut occasionally by farmers to furnish frame timber for barns or houses, for which purpose this species is well adapted. White cedar, as already mentioned, is used largely for shingles, and a great many trees of this species are cut every year for telegraph and telephone poles. But the timber removed from the forest for the latter purpose does not enter into the returns from the mills, and as the work is done by

jobbers and farmers we are unable to arrive definitely at this particular, but important, product.

The figures showing the forest product consumed by the pulpmills do not indicate the extent of that industry in this State, for many of them obtain a part, or all, of this stock of wood from Canada. There are 87 pulpmills in New York. Wisconsin comes next, with 38; then Maine, with 30, and New Hampshire, with 10. In daily capacity New York leads also, with 3,561 tons; Maine comes next, with 2,185 tons; then Wisconsin, 1,404 tons, and New Hampshire, 1,048 tons. The daily capacity of the New York mills is divided into 2,459 tons of ground, and 1,105 of chemical pulp. The mills consumed in 1905, a total of 1,301,986 cords of wood, of which 536,580 cords were cut in this State. The total production of pulp for that year was 977,313 tons. The average stumpage value of spruce pulpwood in the Adirondacks is about \$2.60 per cord, the price varying with its accessibility, density of stand, and proximity of a desirable stream or railroad.

FOREST RESOURCES OF NEW YORK.

In view of the large amount of timber removed each year from the forests of this State it becomes necessary to make a careful inquiry as to the amount that is left. How long will it be before our resources are exhausted?

Various estimates have been made by professional foresters and experts during the last twenty years showing the amount of standing timber in New York. In each case the amount was underestimated. Some of the estimates are already disproved, because a larger amount has been cut since, and the cutting is still going on with a larger annual output than ever before.

We have recently expended considerable time in efforts to ascertain the acreage of woodland in New York and classify it according to its forest composition. As a result of this work I submit an estimate of the amount of standing timber now remaining in the Adiron-

dack and Catskill forests and in the woodlands throughout the State:

	Feet, B. M.
Coniferous species (softwoods or evergreens)....	7,660,000,000
Broad leaved species (hardwoods).....	38,400,000,000
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Total	46,060,000,000
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No great degree of accuracy is claimed for these figures. It is submitted as an approximate estimate based on such information as the Department has been able to obtain after a careful study of the acreage and forest composition. It is tentative rather than final, and will be revised from time to time as further information is obtained. Its value consists chiefly in the fact that there is an entire lack of any other definite statement or estimate.

Of the 7.66 billion feet of conifers we estimate that 5.075 billion feet consists of spruce, nearly all of which is in the Adirondacks, and the greater part of that on State lands. Of the 38.4 billion feet of hardwoods, we estimate that 32.95 billion feet is composed of maple, birch and beech; and that, of the latter, 3.9 billion feet is situated in the woodlands outside the Adirondack and Catskill counties. The other hardwood species in the State consist of chestnut, oak, basswood and elm. The most of the white ash and hickory, because of their greater value, was removed years ago. Nut bearing trees may still be seen in isolated positions on the farms, but these are not included in the estimates of forest or woodland. Prior to 1875, or thereabouts, there was a large quantity of whitewood or yellow poplar (tulip tree) in the woodlands of southwestern New York noticeably in Chautauqua county; but owing to the demand for this highly merchantable species, it has been cut, and now a tulip tree is seldom seen outside of parks or lawns.

TRESPASSES.

The State forestry law relating to trespasses or cutting trees on lands of the forest preserve provides that:

"A person who cuts or causes to be cut or carries away or causes to be carried away any trees, timber, wood or bark from state lands in the forest preserve is guilty of a misdemeanor; he shall also be liable to a penalty of ten dollars for each tree cut, taken away or destroyed by him, or under his direction. The penalty so incurred may be recovered in the action to recover damages for trespass or in a separate action." (Chap. 20, Laws of 1900, Part II, Article XIII, Section 222).

Attention is called to the provision of the above section by which a trespass is constituted a misdemeanor instead of a felony. For this reason petty trespassers have been punished by the imposition of a fine equivalent to three times the value of the timber cut, or in some cases by a penalty of ten dollars a tree, and imprisonment is enforced only when the defendants refuse to pay the fine.

At the same time, offenders of this class can be prosecuted for larceny under a section of the penal code, and hence, in cases where there was a flagrant violation of the law, an intentional trespass of great extent, indictments for grand larceny have been obtained and the defendants are now waiting trial. No trespasses of this kind, however, occurred in 1906, the year for which this report is made.

During the year 1906 the legal department of the Commission has collected and turned into the State Treasury \$19,651.25 which was obtained from fines imposed for cutting trees on State land. Of this amount \$18,566.25 was in settlement of offences committed prior to the current year, and \$1,085.00 for trespasses during 1906.

The forest inspectors, game protectors, and other employes of the Commission are now required by law to report immediately to this office each trespass when discovered, its location, and number of trees cut; also the kind of trees and diameter of the stump. They

are provided with printed blanks on which to make out these reports, and which must be mailed to the superintendent as soon as the offender is discovered and the stumps counted and measured. When the report is received at the Albany office it is entered on a book of record and then handed to the legal department of the Commission for immediate prosecution. In no case will a settlement be made for less than three times the value of the timber; and in aggravated cases or repeated offenses the defendants are indicted for grand larceny.

There are no lumbering operations now on State land as formerly, and the only trespasses committed by lumbermen are where the old blazed line of a State lot has become obliterated, or where there is a disputed boundary. The most of the trespasses in 1906 were by persons who cut trees for firewood.

If the question is asked why these trespasses were not stopped before, I would respectfully call your attention to the fact that prior to the passage of chapter 285, Laws of 1905, the business connected with the suppression of trespasses was entrusted by law to officials belonging to another department of this Commission. When the business was placed in my hands by this law of 1905 all lumbering on State lands was stopped immediately, and timber cutting on the Preserve was suppressed so far that no violations occurred last year, except the petty cases among the poorer class of residents who took trees for firewood, or persons who cut timber along some disputed line or on some lot to which they claimed title and on which they had paid taxes for many years.

AREA OF FOREST PRESERVE.

The Forest Preserve as defined by law includes the lands now owned or which may be hereafter acquired by the State within the county of Clinton, except the towns of Altona and Dannemora, and the counties of Essex, Franklin, Fulton, Hamilton, Herkimer, Lewis, Oneida, Saratoga, Saint Lawrence, Warren, and Washington, in the

Adirondacks ; and the counties of Delaware, Greene, Ulster, and Sullivan, in the Catskills, except

1. Lands within the limits of any village or city, and
2. Lands not wild lands acquired by the State on foreclosure of mortgages made to loan commissioners.

The area of the Forest Preserve at this date is:

	Acres.
Adirondack Preserve	1,415,775
Catskill Preserve.....	104,524
	<hr/>
	1,520,299
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The increase in acreage, over that given in my last report, is due to purchases made during the year.

Of the total acreage in the Preserve, 1,296,852 acres are situated within the Adirondack Park, and 94,468 within the Catskill Park. The lands outside the parks have a total area of 128,979 acres, and each lot or parcel was acquired by the State through a tax sale. These outlying, scattered lands are located as follows:

	Acres.
Adirondack counties.....	118,923
Catskill counties.....	10,056
	<hr/>
	128,979
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THE JOHN BROWN FARM HOUSE.

By a deed of gift dated March 29, 1895, Henry Clews and wife conveyed to the people of New York the tract of Adirondack land situated in North Elba, Essex county, known as the John Brown Farm, and this deed was subsequently accepted by an Act of Legislature.

John Brown lived on this farm prior to his participation in the slavery war in Kansas, and his family were living there at the time

of his raid at Harper's Ferry. After his death his body was brought there from Virginia for burial, in accordance with a request made by him shortly before his execution, which occurred at Charlestown, Va., December 2, 1859.

In 1870, an association of twenty persons was formed through the efforts of the late Kate Field, of Washington, D. C., for the purpose of purchasing and preserving the property, and the farm which had already been offered for sale was bought accordingly. Through its agent, Mr. Clews, the association transferred the property to the State.

The farm contains 243 acres, of which only 40 acres have been cleared; the remainder is covered by the forest. The two-story, unpainted farm house, built by John Brown in 1850, stands near the little enclosure in which his remains are buried.

As the care and custody of this property devolves on the Forest Commission, a custodian was appointed who lives in the farm house. He receives no pay, but he has the use of the house and farm free of rent.

As the house was built 57 years ago it needs repairing, and a failure to do this may incur a charge of neglect. I respectfully recommend that an item of \$300 be inserted in the Supply Bill to provide for a proper care of this historic place.

Very respectfully,

WILLIAM F. FOX.

ALBANY, *December 31, 1906.*



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